National Park Service
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Research Project Summary August 2007

Improving Watershed Health at John Muir National Historic Site

The Question: *What are the factors contributing to exacerbated erosion and flooding within the Mt. Wanda-Strentzel Canyon watershed? What are the possible remedies?*

John Muir National Historic site has recently completed a study to address erosion and flooding concerns in Strentzel Canyon. This briefing summarizes the issues and highlights some of the possible actions to improve watershed health.

The Mt. Wanda-Strentzel Canyon watershed incorporates portions of the John Muir National Historic Site and surrounding private lands. All the streams within the watershed are ephemeral, running dry every summer. However, large winter storms fill these channels with fast-moving runoff that erodes the creek banks and carries large amounts of sediment into Alhambra Creek. This erosion is a natural process, but it has accelerated in recent years.

In 2004, John Muir National Historic Site began studying the underlying factors causing hillside erosion and flooding within the Mt. Wanda-Strentzel Canyon watershed. The study recommends management actions and research that will slow erosion, protect native plant and animal communities, improve habitat downstream in Alhambra Creek, and preserve the character of John Muir's Mt. Wanda.

Kelly Reeves

The network of ephemeral streams on Mt. Wanda carries eroded hillside sediment to the mouth of Strentzel Canyon. and Alhambra Creek.

Marcus Koenen

The shallow roots of non-native grasses accelerate erosion on Mt. Wanda. Dynamic creek channel erosion in the watershed and related downstream flooding prompted John Muir National Historic Site to begin a study that would determine the cause.

The Study: *Conduct a literature review and field work to summarize the land-use history and physical characteristics of the Mt. Wanda Watershed.*

To evaluate the causes of accelerated erosion and flooding, research began to synthesize the available literature on historic land-use, soil conditions and flooding history in the watershed. Researchers then conducted fieldwork to map stream sections in the watershed and to assess the extent of channel damage from accelerated erosion.

The Conclusions: *Significant changes in land use practices caused a shift in vegetation composition that amplified erosion and exacerbated flooding.*

The literature review shows that land-use in the watershed has changed significantly in the past two centuries. Cattle ranching began on the hilltops in the early 1800s. The arrival of gold rush emigrants in the mid-to-late 1800s fueled a broad expansion of grazing and farming in the Martinez area. Cattle grazing continued on the slopes of Mt. Wanda until 1996 when the National Park Service ceased the practice.

The Conclusions (*continued*)

During the mid-1800s, the combination of the grazing pressure, disturbance by agriculture and drought forced a significant change in vegetation. Shallow-rooted exotic grasses replaced deep-rooted native bunch grasses. This shift in vegetation composition likely contributes to erosion seen today along ephemeral creeks in the watershed. The shallow roots of exotic grasses do not hold soil as tightly or hold as much water in the soil as the deeper roots of native grasses. The resulting increase in soil moisture allows precipitation to run more rapidly downslope, eroding the stream banks into deeply incised gullies.

The worst gullying is found on the north and east slopes. In some areas soil has eroded underground into small pipes that conduct water 0.3 to 1 meters below the soil surface. These can enlarge into tunnels or collapse to form a gully. Gullies are telltale signs of the hillside erosion and increased runoff that alter water quality, flooding intensity, vegetation dynamics and aquatic habitat.

The completed watershed study includes 26 recommendations to restore more natural watershed conditions, monitor watershed health, research best management strategies and improve community outreach.

This project was supported in part by the San Francisco Bay Area Inventory and Monitoring Program.

Additional Resources

Almambra Creek Watershed Council
http://www.ccrcd.org/alhambra.html

Inventory and Monitoring Program, National Park Service, San Francisco Bay Area
http://www.nature.nps.gov/im/units/sfan/

For More Information

The full report is available upon request.
Contact Lucy Lawliss, Cultural and Natural Resource Program Manager, John Muir National Historical Site, 1401 Marina Way South, Richmond, CA 94804, 510-232-1544.

Summary of Recommended Actions

Watershed Restoration

1. Slow erosion through several strategies including planting vegetation and building in-stream structures.
2. Where feasible, restore upland grasslands with native perennial grasses.
3. Complete a road plan to identify unnecessary roads and to reduce impacts from fire roads.
4. Remove abandoned dams and impoundments in order to restore more natural stream flow.

Partnerships

1. Continue partnership between the National Historic Site, its neighbors and the Alhambra Creek Watershed Council.
2. Support efforts by local agencies to reduce the risk of wildfire.

Research

1. Conduct a new soil survey. The original soil survey is at too coarse of a scale to address current management concerns.
2. Monitor changes to the depth and width of the stream system, particularly in erosion-prone reaches. Monitor changes in streamside vegetation.
3. Track changes in the amount of runoff carried into Alhambra Creek.

Kelly Reeves

By the time John Muir strolled on Mt. Wanda, non-native grasses had replaced the native grasses. The vegetation shift likely contributes to the accelerated hillside and stream channel erosion seen today.